Goddard Procedural Requirements (GPR)

DIRECTIVE NO.	GPR 5340.4	**APPROVED BY Signature:**	*Original signed by Arthur F. Obenschain for*
EFFECTIVE DATE:	July 6, 2010	**NAME:**	Robert Strain
EXPIRATION DATE:	July 6, 2015	**TITLE:**	Director

COMPLIANCE IS MANDATORY

Responsible Office: Code 320 Mission Support Division

Title: Problem Reporting and Problem Failure Reporting

PREFACE

P.1 PURPOSE

This procedure establishes the requirements for recording, tracking, and closure of product anomalies in space flight projects up to launch.

P.2 APPLICABILITY

This procedure applies to hardware, software, and ground support equipment for space flight projects managed by the GSFC (Goddard Space Flight Center) and subject to the GSFC Management System per GPR 1280.1.

P.3 AUTHORITY

a. NGD 1280.1, NASA Management System Policy
b. NPR 7120.5, NASA Space Flight Program and Project Management Requirements

P.4 APPLICABLE DOCUMENTS

GPR 1280.1, The GSFC Quality Manual
320-MAR-1001, Standard Mission Assurance Requirements

P.5 CANCELLATION

N/A

P.6 SAFETY

N/A

P.7 TRAINING

N/A

P.8 RECORDS

Record Title	Record Custodian	Retention
PR/PFR Database	Code 302, Institutional Support Office	*NRRS 8/101 - Permanent. Cut off records at close of program/project. Transfer to records center storage. Transfer to National Archives 7 years after cutoff

**NRRS – NASA Records Retention Schedules (NPR 1441.1)*

P.9 MEASUREMENT/VERIFICATION

Project problem and failure statistics are presented monthly by Code 320 to Code 300 and, as warranted, by Code 300 to the CMC (Center Management Council).

PROCEDURES

In this document, a requirement is identified by "shall," a good practice by "should," permission by "may" or "can," expectation by "will," and descriptive material by "is."

1. The Project shall document and implement an anomaly management system that records and tracks anomalies from discovery to closure:

a. For in-house activity the Project shall use the PR/PFR (Problem Report/Problem Failure Report) database. See //prpfr.gsfc.nasa.gov for information and access.

   Note: the Project shall document a separate management system to record and track to closure test deviations (refer to Fig. 1).

b. For out-of-house activities the Project shall require developers to document and implement an anomaly management system per contractual requirements. See 320-MAR-1001 Standard Mission Assurance Requirements for typical requirements.

2. The anomaly management system shall describe the following:

a. Roles and responsibilities for participants in the anomaly review process.
b. Process for identifying and processing a PR or PFR (refer to Fig. 1 for a typical process flow).
c. Anomaly notification process.
d. Anomaly documentation process. Hardware anomalies are documented beginning with receipt of piece parts. Software anomalies are documented beginning with first use of flight build software.
e. Anomaly documentation process for ground support equipment and non-flight items.

f. Identification and control of items that have open anomalies, including physical segregation when applicable.
g. Investigation and troubleshooting of anomalies to identify root cause (refer to Fig. 1).
h. Actions that can be taken regarding items as part of a PR or PFR, to include:
    (1) Rework - Action taken on nonconforming product so that it will fulfill the specified requirements; this includes software upgrades
    (2) Repair - Action taken on nonconforming product so that it will fulfill the intended use, although it does not conform to the originally specified requirements
    (3) Use-As-Is - Approving the use of nonconforming product without resort to rework or repair; for software, this may require operational notes to avoid the effects of the nonconforming product during operation
    (4) Reclassify - Action taken to revise the classification status of nonconforming product for alternate use (e.g., reclassify from "Space Flight Hardware" to "Not for Space Flight Use"); product re-classification shall be noted on the applicable WOA (Work Order Authorization) or software product equivalent
    (5) Return to Vendor - Action taken to return nonconforming product to the vendor in accordance with contract provisions
    (6) Scrap - Action taken on nonconforming product to make it unusable and to remove it from use; this disposition shall specify how the product will be scrapped
i. Corrective and preventative action processes.
j. Process for determining required regression testing.
k. Risk rating determination for PFRs, as follows:
    (1) Failure Effect Rating to indicate the potential impact of the anomaly on hardware or software performance if it occurred during the mission. Redundancy shall be ignored in establishing this rating. The project shall assign a failure effect rating per the following criteria and corresponding numerical values:

        1 – Negligible or no effect on mission, system or instrument performance, reliability or safety.
        2 – Moderate or significant effect on the mission, system or instrument performance, reliability or safety, defined as: an appreciable change in functional capability, an appreciable degradation of engineering or science telemetry, causing significant operational difficulties or constraints, or causing a reduction in mission lifetime.
        3 – Catastrophic or major degradation to mission, system or instrument performance, reliability or safety.

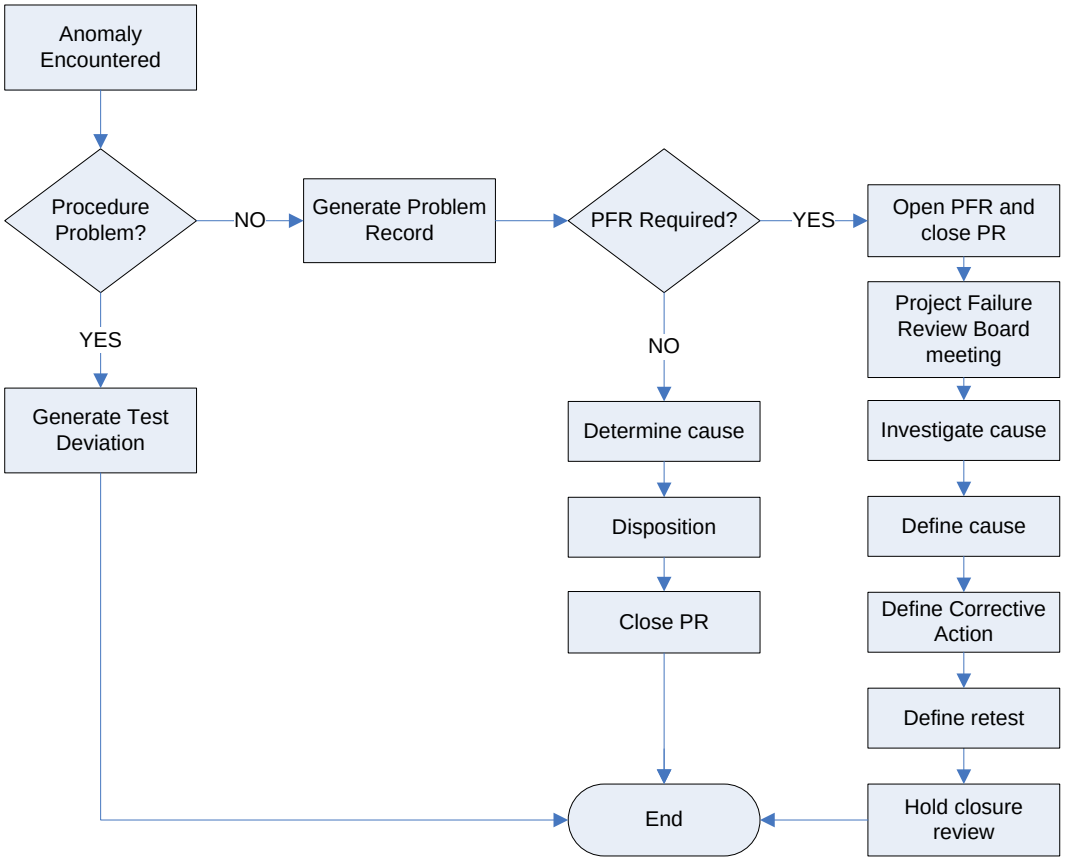
    (2) Failure Corrective Action Rating to indicate the confidence in understanding both the cause of the anomaly and the effectiveness of resulting corrective action. The project shall assign a failure corrective action rating per the following criteria and corresponding numerical values:

        1 - Recurrence very unlikely – the root cause of the anomaly has been determined with confidence by analysis or test. Corrective action has been determined, implemented, and verified with certainty. There is a very low probability of recurrence.

2 - Recurrence unlikely – the root cause of the anomaly has not been determined with confidence. However, some corrective action has been determined, implemented, and verified to the extent that there is a very low probability of recurrence.
3 - Recurrence possible – the root cause is considered to be known and understood with confidence. Corrective action has not been determined, implemented, or verified with certainty. There exists some possibility that the anomaly may recur.
4 - Recurrence credible – the root cause has not been defined with confidence. Corrective action has not been determined, implemented, or verified with certainty. There exists some possibility that the anomaly may recur.

l. Identification of Red Flag PFRs: the project shall identify a PFR with a failure effect rating of 2 or 3 and a failure corrective action rating of 3 or 4 as a Red Flag PFR to indicate a significant residual risk. The project shall present Red Flag PFRs at milestone reviews and shall enter them into the project risk management system.
m. Closure review and approval process. This process shall require the approval signatures of the PDL (Product Design Lead) and QE (Quality Engineer) for PRs, except that the SE's (Systems Engineer) signature is also required at the beginning of I&T (Integration & Test). The PFR process shall require the approval signatures of the PDL, CSO (Chief Safety and Mission Assurance Officer), Project Representative, and ad hoc members, except that the SE signature is also required beginning with I&T.

Figure 1. Typical Anomaly Management Process Flow



Appendix A – Definitions

A.1. Anomaly - An unexpected event that is outside of certified design/performance specification limits.

A.2. Close Call - An event in which there is no injury or only minor injury requiring first aid and/or no equipment/property damage or minor equipment/property damage (less than $1000), but which possesses a potential to cause a mishap.

A.3. Corrective Action – Action taken to address the root cause of an anomaly and the follow-up action undertaken to assess the effectiveness.

A.4. Disposition – Planned action to correct, accept, or otherwise mitigate condition.

A.5. Failure – The cessation of proper function or performance.

A.6. Failure Review Board (FRB) – A working group of personnel formed at the project level and authorized by the project to investigate, analyze, determine cause and corrective action, and to disposition PFRs.

A.7. Nonconforming – Not fulfilling a specified requirement.

A.8. Problem Report (PR) – A report generated in the PR/PFR database in response to an anomaly that occurred or is suspected to have occurred with respect to flight project products, including hardware, software, and GSE (Ground Support Equipment).

A.9. Problem Failure Report (PFR) – A report generated in the PR/PFR database in response to the analysis of a PR that determines that there may be a significant risk to an aspect of mission success and that a project level review board is required for disposition. Examples of PRs that would be elevated to a PFR include: blown fuse; overvoltage; overcurrent; limit failure; connector mis-mate; change in hardware or software; hardware overstress; damage to flight or GSE hardware; personnel injury; safety violation.

A.10. PR/PFR Database - An inter-active on-line database that is used to document and track the status of nonconforming product and associated dispositions. The database is located at URL: https://gprs.gsfc.nasa.gov/.

A.11. Test Deviation – A process error in a test procedure that has been discovered as part of a review, test setup, or test. Examples include typographical errors, out of sequence performance, unavailable equipment, and a change in limits.

Appendix B – Acronyms

CMC	Center Management Council
CSO	Chief Safety and Mission Assurance Officer
FRB	Failure Review Board
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
I&T	Integration and Test
PDL	Product Design Lead
PFR	Problem Failure Report
PR	Problem Record
QE	Quality Engineer
SE	Systems Engineer
WOA	Work Order Authorization

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	07/06/10	Initial Release